

Modigliani mentions seeing in South-West Nias natives with Arianoid Semitic features and curly or wavy hair, but he himself suspects in such cases the influence of Arabo-Malay immigrants from Acheen.

Amongst the many peculiarities of the inhabitants of Nias, is the custom of the women going about with a long slender stick called *sio*; it is of Nibong palm wood, has a heavy leaden knob, and is more or less ornamented with rings of lead and brass; it is found only in the possession of women. Great is the variety of ornaments worn by the Niassers, male and female. They often denote distinctions of rank and sex. Ear-rings and bracelets are especially varied; singularly beautiful are the bracelets (Fig. 5) carved and polished by a long and tedious process out of a solid block taken from the stony shell of the giant clam (*Tridacna*), more elegant in shape than the equally notable armlets of the same material made by the in-

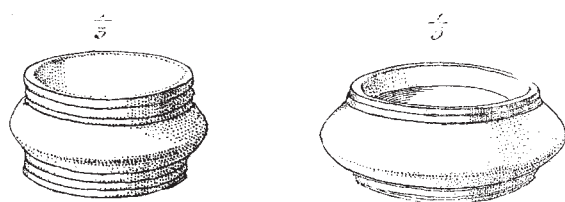


FIG. 5.—Bracelets cut in *Tridacna* shell.

habitants of the Solomon Islands. The Niassers also carve big solid ear-drops out of the *Tridacna* shell. Their principal articles of dress are still made with the beaten and manipulated inner bark of a *Ficus* or *Arctocarpus*, a kind of *tappa* or *masi*, called by them *sambò salôwo*.

Dr. Modigliani did not find or hear of stone or shell implements in Nias; possibly the first men who peopled that island were already provided with iron tools. Yet one of the commonest amongst these, the axe, *fîto*, has a singularly archaic form: the iron blade, very similar to the earlier forms of copper and bronze implements of the kind, is let into a slot in a short club-shaped wooden handle (Fig. 6). A yet more singular fact is that the *fîto* of the Niassers is a typical axe, and quite distinct from the adze used right across Malesia from the Nicobar Islands to New Guinea, being, instead, remarkably like the iron axe of some of the wilder tribes of Central Africa.

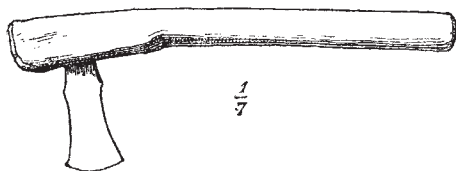


FIG. 6.—Iron axe of Nias

I may mention here that the rich and important anthropological and ethnological collections made at Nias by Dr. Modigliani have mostly been presented by him to the National Anthropological and Ethnological Museum in Florence.

Dr. Modigliani has collected quite a host of interesting facts relating to the myths and superstitions of the natives of Nias, which all appear to centre in a well-developed form of "ancestor worship." The ancestors more or less remote are spirits good and evil, and as mediators between them and the living are numerous *adû*, or idols (Fig. 7). Amongst the numerous spirits more or less divine venerated by the Niassers is *Sangardfa*, the sea-god, and Modigliani justly calls attention to the strange similarity in name and attributes to *Tanga-roa*, the sea-god of the Maories and other Polynesians. The principal good spirit is *Lawalâni*; the bad

ones are classified in two grades as *Bèchu* and *Bèla*, these being, however, generic terms. The *adû* or idols, whose Nias name, by the way, is singularly like the equivalent Polynesian term *atua*, are very numerous; those which represent dead relations or immediate ancestors are called generically *Adû zatûa*. They appear to have great affinities with similar carved wooden anthropomorphic figures common throughout Papuasia and Melanesia, and known as *karwars* in Western New Guinea.

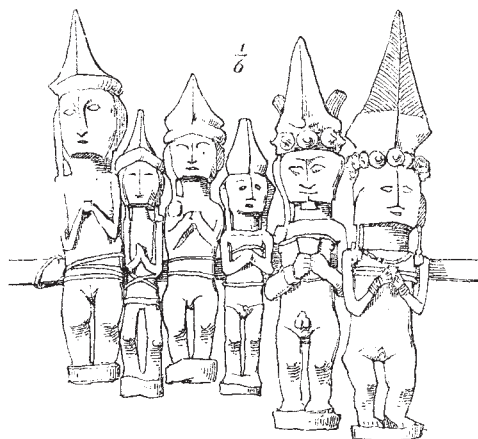


FIG. 7.—Images of ancestors.

In one of the last chapters of his book, Modigliani gives an account of the spoken language of the Niassers, which has many peculiarities; adding an alphabetically arranged collection of words with their Italian equivalents.

But my task, which has been to endeavour to give an idea of the work done by Dr. Modigliani, must now come to an end. His book, containing a very complete monographic study of one of the most interesting islands of the Indian Archipelago and its inhabitants, is, and will long remain, one of the standard works on that beautiful region Malesia.

HENRY H. GIGLIOLI.

NOTES.

THE next general meeting of the Institution of Mechanical Engineers will be held on Thursday evening, May 1, and Friday evening, May 2, at 25 Great George Street, Westminster. The chair will be taken at half-past seven on each evening by the President, Mr. Joseph Tomlinson. On Thursday evening the President will deliver his inaugural address, after which the following paper will be read and discussed, and the discussion will be continued on Friday evening:—Research Committee on Marine-Engine Trials: Report upon Trials of three Steamers, *Fusi Yama*, *Colchester*, *Tartar*, by Prof. Alexander B. W. Kennedy, F.R.S., Chairman. The anniversary dinner will take place on Wednesday evening, April 30.

THE first annual meeting of the Museums' Association will be held in Liverpool on June 17, 18, and 19. The business of the meeting will consist of (1) the reading of papers on the management, arrangement, and working of Museums; (2) the discussion of the objects set forth by the meeting of June 20, 1889, with special reference to the following points: the means of interchange of duplicates and surplus specimens; schemes for a general supply of labels, illustrations, &c.; the indexing of the general contents of Museums; concerted action for obtaining Government publications, and also specimens on loan or otherwise; and the issue of a journal devoted to the discussion of practical topics. At this meeting the scheme for the constitution of the Association will be submitted. All engaged or interested

in Museum work are cordially invited to join the Association. The conditions of membership are as follows:—Each Museum contributing not less than one guinea a year becomes a member of the Association, and can send three representatives to the meetings. Individuals interested in scientific work are admitted as Associates on payment of 10s. 6d. annually. The following are the officers of the Association:—President: Rev. H. H. Higgins; General Secretaries: H. M. Platnauer, Museum, York, T. J. Moore, Museum, Liverpool; Local Secretaries: R. Paden, Museum, Liverpool, H. A. Tobias, Museum, Liverpool.

THE next *conversazione* of the Royal Microscopical Society will be held on Wednesday, the 30th inst., at eight o'clock.

HERR O. JESSE sends us from Steglitz, near Berlin, some very beautiful photographs of luminous night clouds. The photographs of each pair were taken simultaneously at Nanen and Steglitz. Steglitz lies 8 kilometres south-west, Nanen 38 kilometres west-north-west, of the Berlin Observatory. Herr Jesse would add greatly to the value of his work if, the next time he has an opportunity of undertaking it, he would photograph the spectrum.

La Nature (April 12, p. 303) notes the following curious and interesting phenomena:—Two railways, one the Sceaux line and the other the Ceinture, pass within a comparatively short distance of the Montsouris Observatory, Paris, the former line being about 80 metres distant, and the latter but some 60 metres. During the passage of trains on the Ceinture line, which is nearest to the Observatory, the bifilar magnet is found to be disturbed, and its oscillations are registered photographically; indeed the movements are so regular that the curve clearly indicates the exact time of each train passing the Observatory. This phenomenon is due to the fact that as the line crosses the direction of the magnetic meridian the wheel-tires of the carriages become magnetized by induction, and so produce, in consequence of the laws of magnetism, a deviation of the bifilar magnet. The trains on the Sceaux line give rise to a phenomenon not less curious. Whenever the engine-driver blows off steam, the electrometer is partly discharged, the electrical potential of the air falling to about one-half of its original value. These disturbances are brought forward by the Director of the Paris Observatory in order to oppose the scheme which is now proposed of extending the railway from Sceaux to la Place de Médicis.

ON Tuesday evening, M. Jacques Bertillon (head of the Municipal Bureau of Statistics in Paris) delivered a lecture before the Anthropological Institute of Great Britain and Ireland, on the method now practised in France of identifying criminals by comparing their measures with those of convicted persons in the prison registers. Mr. Bertillon, who spoke in French, said that the system which he had come there to explain had for its object the recognition of a person 10, 15, 20, or even 100 years after he had been measured, for by that method it was possible to recognize a person after death, if access could be had to his skeleton. Photography was now used only as an aid to identification established by other means. The basis of the anthropometric system was to obtain measurements of those bony parts of the body which underwent little or no change after maturity, and could be measured with extreme accuracy to within so small a figure as to be practically exact. These parts were the head, the foot, the middle finger, and the extended forearm from the elbow. To clearly illustrate the system, let them suppose 90,000 photographs of men to have been collected. These would be divided into three groups of 30,000, according to the height of the men. There would be short men, men of medium height, and tall men. That these three classes might be approximately equal, it was evident that

the limits of the class of men of medium height must be restricted more than those of the other two classes. Each of these primary divisions should again be divided on the same principle, without taking any further notice of the height, into three classes, according to the length of the head of each individual. The three classes of short, medium, and long heads would each again be subdivided into three, according to the width of the heads, and would contain narrow, medium, and wide heads. Experience had proved that with most people the breadth of the head varied independently of the length—that was, given that an individual had a certain length of head, it by no means followed that the breadth of his head could be determined *a priori*. The length of the middle finger gave a fourth and still more precise indication by which to divide again each one of the packets of photographs; and these might be divided again according to the length of the foot, the length of the arms outstretched at right angles to the body, and also according to the colour of the eyes. Thus by these anthropometrical coefficients they would be able to divide their collection of 90,000 photographs into very small groups of about 15 each, which they could easily and rapidly examine. M. Bertillon then proceeded to give a practical demonstration of the way in which the measurements were taken. He laid stress on the importance of the hand and the ear as marks of cognition. The hand, because it was the organ in most constant use in almost every calling and in many trades and professions, became modified according to the particular character of the work which it had to do. The ear was the precise opposite to this. It changed very slightly, if at all, except perhaps in the case of prize-fighters, who developed a peculiarity of the ear which it was easy to recognize. The ear, therefore, was an important organ to measure, inasmuch as the results were not likely to be nullified by a change in its conformation.

THE following telegram was sent through Reuter's agency from New York on April 21:—"Despatches from Mexico state that observations show that the height of the active volcano of Popocatepetl has decreased by 3000 feet since the last measurement was taken."

IN the new quarterly statement of the Palestine Exploration Fund, the Committee announce that they have obtained a firman granting permission to excavate at Khürbet 'Ajlân, the Eglon of Joshua. It is understood that all objects, except duplicates, found in the course of the excavations shall be forwarded to the Museum at Constantinople, but that the Committee's agents shall have the right of making squeezes, sketches, models, photographs, and copies of all such objects. The Committee have been so fortunate as to secure the services of Mr. Flinders Petrie, who is now in Syria making arrangements to start the excavations.

THE death of Dr. Gottlob Friederich H. Küchenmeister is announced. He was a great authority on Entozoa.

IN the official outline of the principal arrangements at the Crystal Palace for the summer of 1890, reference is made to the International Exhibition of Mining and Metallurgy which is to be held there from July 2 to September 30. The subjects embraced within the scope of the Exhibition comprise machinery in motion and at rest; gold, silver, diamond, iron stone, and iron ore mining; manufacture of iron and steel; lead mining and manufacture; tin mining and smelting; copper and coal mining; the petroleum and salt industries; mining for precious stones, &c. There is every reason to expect, through the co-operation of colonial and foreign Governments, many valuable exhibits from abroad.

THE *Engineer* and *Engineering* of last week publish long illustrated accounts of the recent disaster to the City of Paris

This accident is without a parallel in the history of steam navigation; the circumstances were so remarkable that many conflicting explanations of the cause have been suggested. The ship is propelled by twin screws, and the engines are placed side by side in separate compartments. When she was off the coast of Ireland, at half-past five on the evening of the 25th ult., the low-pressure cylinder, with the whole of its gear, of the starboard engine, went to pieces, and fell to the bottom of the engine-room in a confused mass, the *débris* of the top cylinder cover being apparently at the bottom of the wreck. The smashing of the condenser allowed an enormous rush of water to flood the starboard engine-room, and the longitudinal bulkhead between the engines, being also damaged, allowed the port engine-room to become flooded, and of course stopped that engine from working. Our contemporaries say that, in the opinion of experts in Liverpool, the accident did not originate in the engine, but in the tail shaft, as follows: the brass liner on the tail shaft burst; then the lignum-vitæ strips were torn out, bringing metal to metal. This, naturally, would allow the steel shaft to grind itself and the bracket away, and the shaft dropped. Then the continual bending of the shaft resulted in its fracture. The engines, being relieved of the resistance of the screw, raced, with the result shown in the engravings. The *Engineer* at present neither accepts nor rejects this theory of the cause of the disaster.

THE Manchester Field Naturalists' Society opened the summer excursion session on the 19th inst., by a visit to the well-known herbaceous garden of Mr. Wm. Brockbank, Withington, near Manchester. The grounds, of about six acres in extent, are laid out in woodland, shrubbery, rockeries, and fernery, with a patch of wilderness, and are entirely devoted to the growth of the native flowers, and the horticulturists' modifications, so far as they will thrive. The special feature, at the time of the visit, was the display of daffodils, over a hundred varieties being included in the gardens, several of them locally raised. Mr. Brockbank explained that the double variety of the daffodil is not obtained by the absorption of the essential organs, as generally supposed; the pistils and stamens remain, and specimens were shown, in vigorous health, obtained from their seeds.

It has been suggested that the epidemic of influenza was in the last resort due to floods in China. The fertile land in the valley of the Yellow River, it has been said, was covered with a deposit of alluvial mud, and in this mud countless numbers of organic spores were developed from the refuse of a dense population. These germs were carried by merchandise to Russia, whence they spread to Europe generally. Dealing with this theory, the *Shanghai Mercury* points out (1) that there has been no epidemic of influenza in China. (2) There is no valley whatever of the Yellow River, the peculiarity of that stream being that it flows on the surface of the ground, which actually slopes down on both sides from the river bed, so that in case of a breach of either embankment the river is free to flow to the sea almost anywhere between Tientsin in the north, and Shanghai in the south. (3) The plain of the Yellow River is by no means fertile, and is rapidly deteriorating. (4) So far from the deposit left after a breach being alluvial mud, it is unmitigated sand, and for years refuses to grow any crops whatever; and it is only after an exposure of some fifteen or twenty years that the phosphates which enter sparingly into its composition begin to break up, and the land is restored to cultivation. (5) There are no exports of any sort from the plain of the lower Yellow River. Almost the only product exported to Europe from districts anywhere near the river is straw braid, which is shipped not to Russia but to England and the United States; and this not from the plain, but from the highlands of Shantung, far removed from any communication with the river.

THE Ballarat School of Mines, in the University of Melbourne, presented its annual report at a meeting of governors and subscribers on Monday, January 20. The general efficiency and usefulness of the school have been greatly promoted by extensive additions to the buildings and plant, and the numerous improvements effected in connection with the mining and metallurgical departments. That the institution now affords a superior training in scientific and mining subjects is shown by the attendance of a more advanced class of students, and by the better results obtained at the examinations. It attracts to its classes students from all the neighbouring colonies, including Queensland, New South Wales, South Australia, and Tasmania, as well as from distant places within Victoria. The total number of enrolments in the various classes held during the year was 982, and of individual pupils who attended the elementary science lectures delivered in the State schools, 723. The mean average number of students in attendance at the school classes for the whole year was 526, whilst during the same period 286 lectures on elementary chemistry were delivered in nine of the State schools in the city and town, with an average attendance of 53 at each lecture.

MR. A. J. CAMPBELL has returned to Melbourne after a three months' trip in Western Australia. The *Victorian Naturalist* says he has been very successful in his observations and collections. He obtained about 80 different species of eggs, 13 of which it will be necessary to describe as new. The number of eggs obtained altogether was about 400. About 100 skins of birds were collected, though Mr. Campbell made no special effort to secure them. With regard to geographical range of birds he was particularly successful in his observations. No less than 17 species will be recorded as new for Western Australia. Possibly one or two may be deemed new varieties, while others will be restored, having been omitted from a lately issued tabular list. Baron von Mueller has examined the plants, and finds that two ferns, *Asplenium marinum* and *A. trichomanes* (both British species, by the way) are recorded for the first time from the western colony. Of 30 lichens collected, the Rev. F. R. M. Wilson has identified 20 as new for the same colony. Specimens of characteristic lizards and frogs (e.g., *Heleioporus albo-punctatus*) were secured. About three dozen photographs turned out fairly well, those of the remarkable flights of sea-birds being of great interest. Mr. Campbell considers that he brought nearly 1000 natural history specimens back to Melbourne.

IN the latest of his series of instances—printed in the *American Naturalist*—of the effect of musical sounds upon animals, Mr. R. E. C. Stearns mentions the case of a canary "who is particularly fond of music." This interesting bird belongs to the Rev. Mr. James, who writes as follows:—"Immediately I begin to play upon the flute she chirps about as if enjoying the music. If I open the cage-door and leave her, she will come as near to me as possible, but not attempt to fly to the music; but if I put her upon my desk, and lay the flute down, she will perch upon the end, and allow me to raise the instrument and play. I often take her into the church and play there upon the organ, and she will perch upon my fingers, notwithstanding the inconvenience of the motion of the hands, and chirp in evident delight at the sweet sounds."

LAST week Prof. Stricker submitted to the International Medical Congress at Vienna a new electrical lantern which will, it is expected, be of great service to lecturers and medical students. According to the Vienna correspondent of the *Times*, Prof. Stricker, by an ingenious combination of lenses, contrives to project the magnified images of objects on a white screen in their natural colours, so that, for instance, a small pimple on a patient can be shown in its real appearance to an audience of many hundred students.

At the seventh Congress of the American Ornithologists' Union, Dr. R. W. Shufeldt read a report on progress in avian anatomy for the years 1888-89. Towards the end of this report, which has now been reprinted separately, Dr. Shufeldt said he had greatly felt the need of a good hand-book to the muscles of birds. In looking about him, he soon found that there was no such manual in the English language; at least, there was not the kind of work that the thorough dissector required. To meet this want he undertook the preparation of a volume devoted to the subject. A thoroughly cosmopolitan form, or rather a form well representing a cosmopolitan group of birds, the raven, was selected. He carefully dissected out on many specimens every muscle of this type, and figured them in a careful series of drawings. These he supplemented by a series of drawings of the skeleton of the same form, and on the bones indicated the origin and insertion of all the muscles. Full descriptions were written out, and the groups of muscles classified; and finally some comparative work was added. Both the drawings of the muscular system, as well as the skeleton, were life-size, which made the parts very clear and convenient for use. "To my surprise," says Dr. Shufeldt, "when it was all completed, the manuscripts for a small volume were on my hands." The work is now in the press, and will be published shortly by Messrs. Macmillan and Co.

Two volumes of the *Internationales Archiv für Ethnographie* have now been completed. With the current number, just issued, the third volume begins. In a prefatory note, the editor, Dr. Schmeltz, refers with satisfaction to the help he has received from eminent contributors; and he is able to promise that the periodical shall be not less instructive and interesting in the future than it has been in the past. In the present number there are several valuable papers. One of them, by Dr. Franz Boas, deals with the use of masks and head-ornaments on the north-west coast of America. Herr Strebel, of Hamburg, contributes the first of a series of "studies" on a peculiar kind of stone implements found in Mexico and Central America. Hitherto it has been generally supposed that these implements were put on the necks of human victims destined for sacrifice. The author undertakes to show that this view is mistaken.

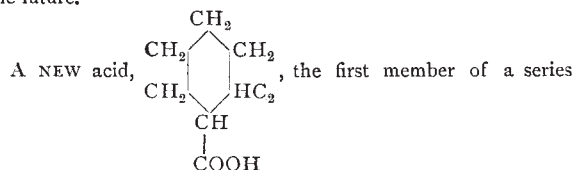
THE *Journal of the Anthropological Institute* (vol. xix. No. 3) contains an elaborate and most interesting paper, by Prof. A. C. Haddon, on the ethnography of the western tribe of Torres Strait. The other contributors to this number are Dr. Beddoe, who writes on the natural colour of the skin in certain Oriental races; and the Rev. James Macdonald, who has a paper on the manners, customs, superstitions, and religions of South African tribes.

THE *Photographic Quarterly*, of which three numbers have been published, meets a need which must often have been felt by those who specially devote themselves to photography. It includes among its contributors many eminent students, and deals freely with all important questions in which photographers are interested. The third number opens with an article on photography of the sky at night, by Captain W. de W. Abney. Among the other contents are papers on the limits and possibilities of art photography, by George Davison; photogravure and heliogravure, by P. G. Hamerton; the optical lantern as an aid in teaching, by C. H. Bothamley; and a phase of naturalistic focussing, by H. Dennis Taylor.

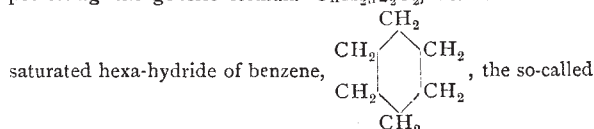
A COMPLETE index of the papers printed in the Proceedings of the London Mathematical Society has been issued. It will be of great service to all who have occasion to refer to the series, which now includes twenty volumes.

A CATALOGUE of the books in the library of the Indian Museum has been issued by the trustees. It has been compiled by Mr. R. Leonard Chapman. The number of separate works

in the library is about 3500, and every facility is given to students consulting them. In a prefatory note Mr. J. Wood-Mason, superintendent of the Indian Museum, says that most of the books are on zoology and kindred subjects, and he has no doubt that "the gradual spread of scientific education in India will largely extend the field of usefulness of the Museum library in the future."



possessing the generic formula $C_nH_{2n-3}O_2$, derived from the



naphthene and its homologues of the generic formula C_nH_{2n} , has been isolated by Dr. Ossian Aschan, of the University of Helsingfors, from the natural oil of Baku (*Berichte*, 1890, No. 6, p. 867). The acid may be considered as a saturated hexa-hydride of benzoic acid; it is a very stable liquid substance of strongly acid properties, readily decomposing calcium chloride with evolution of hydrochloric acid and formation of a calcium salt. The raw mixture of acids obtained by treating the oil with alkali, and subsequent decomposition of the sodium salts by dilute sulphuric acid, was first distilled and the lower boiling portion specially examined. Upon partially saturating this fraction with caustic soda solution, and again decomposing with sulphuric acid, a colourless oil separated. In order to separate the various acids contained in this oil, they were converted into methyl esters by the action of methyl alcohol and strong sulphuric acid. These esters were then submitted to fractional distillation, when a large quantity of an ester boiling constantly at $165^{\circ}5-167^{\circ}5$ C. was eventually isolated, possessing the composition $C_6H_{11}.COOCH_3$. This was, in fact, the methyl ester of the new acid, the first member of the series, of which other higher members have previously been obtained by Markovnikoff and others. The methyl ester is a highly refractive colourless oil of pleasant fruit-like odour. By saponification with alcoholic potash, crystals of the potassium salt of the acid itself were obtained. On acidification of the aqueous solution of these crystals, the free acid separates as an oil, which after rectification boils constantly at $215^{\circ}-217^{\circ}$. It is a colourless thick liquid of unpleasant and very persistent odour, and does not solidify at -10° . Its strength as an acid has already been alluded to as evidenced by the turning out of hydrochloric acid from chlorides of the alkaline earths; moreover, the calcium and barium salts are not decomposed by carbonic acid. Strong sulphuric acid readily dissolves it, with decomposition upon heating. Its specific gravity at $18^{\circ}4$ is 0.95025. This acid is isomeric with the methyl pentamethylenic acid synthesized by Messrs. W. H. Perkin, Jun., and Colman, the latter boiling a little higher, at $219^{\circ}-219^{\circ}5$, and possessing a higher specific gravity, 1.02054 at 15° . The potassium salt $C_6H_{11}.COOK$ is a soft soap-like substance, which may sometimes be obtained in distinct crystals. It is readily soluble in water and alcohol and is strongly hygroscopic. The sodium salt much resembles its potassium analogue, and may be obtained crystallized in flat prisms from alcohol. It likewise deliquesces very rapidly in the air. The calcium salt dissolves readily in alcohol, but is more difficultly soluble in water. If an aqueous solution is allowed to evaporate over oil of vitriol, the salt, $(C_6H_{11}.COO)_2Ca + 4H_2O$, is obtained in long needles. If a solution saturated at the ordinary temperature is heated to boiling, it becomes turbid and viscous drops begin to separate; these

again dissolve on cooling. This behaviour is very characteristic of the acid, the barium salt showing the phenomenon also in a striking manner. It is due to the different amounts of water of crystallization in the salts separating at different temperatures. The chloride of the acid radical, the amide, and the anilide of the acid have also been prepared, and found to resemble the corresponding derivatives of the fatty acids.

THE additions to the Zoological Society's Gardens during the past week include two Indranees Owls (*Syrnium indralee*) from Ceylon, presented by Mr. A. R. Lewis; two Latase's Frogs (*Rana latastei*) from Italy, presented by Mr. G. A. Boulenger, F.Z.S.; a Common Moorhen (*Gallinula chloropus*), British, two Moorish Toads (*Bufo mauritanica*) from North Africa, presented by Mr. Cuthbert Johnson; an Indian White Crane (*Grus leucogeranus*), two Black-gorgeted Jay Thrushes (*Garrulax pectoralis*), an Indian Muntjac (*Cervulus muntjac* ♂) from India, deposited; a Pacific Fruit Pigeon (*Carpophaga pacifica*) from the Solomon Islands, four Madagascar Weaver Birds (*Foudia madagascariensis*, 2 ♂ 2 ♀), two from Madagascar, six Common Cormorants (*Phalacrocorax carbo*), European, two Adelaide Parrakeets (*Platyercus adelaide*) from South Australia, purchased; a Puma (*Felis concolor*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

OBJECTS FOR THE SPECTROSCOPE.

Sidereal Time at Greenwich at 10 p.m. on April 24 = 12h. 11m. 30s.

Name.	Mag.	Colour.	R.A. 1890.	Decl. 1890.
			h. m. s.	
(1) G.C. 2838	—	—	12 13 13	+15 7
(2) G.C. 3035	—	—	12 25 15	+12 59
(3) G.C. 3092	—	—	12 29 50	- 3 11
(4) 3 Canum Venat. ...	6	Yellowish-red.	12 14 23	+49 35
(5) o Virginis	4	Yellow.	11 59 36	+ 9 29
(6) η Virginis	3	White.	13 14 18	- 0 3
(7) B.D. + 1°2694 ...	8	Red.	12 19 7	+ 1 27
(8) S Ursæ Majoris ...	Var.	Strong red-yellow.	12 39 7	+61 42

Remarks.

(1, 2, 3) Although the constellation Virgo is so exceptionally rich in nebulae, comparatively few of them have been submitted to spectroscopic examination. Smyth remarks that "the situation of the extraordinary conglomerate of nebulae and compressed spherical clusters which crowd the Virgin's left wing and shoulder is pretty well pointed out to the practised naked eye by ε, δ, γ, η, and β Virginis, forming a semicircle to the east, whilst, due north of the last-mentioned star, β Leonis marks the north-west boundary." As it is not possible to give anything like a complete list, three of the brighter ones which have not yet been spectroscopically observed have been selected. No. 1 is the remarkable spiral nebula 99 M Virginis, and is thus described in the General Catalogue:—"A very remarkable object; bright; large; round; gradually brighter in the middle; three-branched spiral." No. 2 is 87 M Virginis, and is described as "Very bright; very large; round; much brighter in the middle." No. 3 is described as "Very bright; considerably large; pretty much elongated in a direction about 63°; very suddenly much brighter in the middle to a nucleus." It is a remarkable fact that all the nebulae in Virgo, which have so far been examined, exhibit so-called "continuous" spectra. D'Arrest observed the nebulae G.C. 2930 (84 M Virginis), 2961 (86 M), 3021 (49 M), and Lieutenant Herschel observed G.C. 3021, 3132, 3227, 3229, and 3397. Some of these may be re-examined for bright maxima in the continuous spectra.

(4) The spectrum of this (Group II.) star is thus described by Dunér:—"The bands 2-8 are well marked by strong lines which terminate them on the violet sides. But, with the exception of 2 and 3, they are rather narrow, and the spectrum approaches to the type of Aldebaran." The star is obviously at a transition stage between Groups II. and III., and a special detailed study of the lines and bands should be made.

(5, 6) The spectra of these two stars have been observed by Vogel, who states that the first has a spectrum of the solar type, whilst the second is one of Group IV. The usual further observations are required in each case.

(7) Notwithstanding the small magnitude of this star, it has, according to Vogel, a magnificent spectrum of Group VI. The star is not included in Dunér's Catalogue, and Vogel gives no particulars as to the number and character of the bands present. Further detailed observations are obviously required. The intensity of the carbon band near λ564, as compared with the other bands, should be particularly noted.

(8) This variable will reach a maximum about April 27. Its period is about 225 days, and it varies from 7.2-8.2 at maximum to 10.2-12.8 at minimum. According to Dunér, the spectrum is one of Group II., but very feebly developed. As no details of the spectrum are given, it seems probable that the observation was made near minimum, and the present maximum may afford an opportunity of securing further observations. As in similar variables, bright lines may also be looked for.

A. FOWLER.

MATHEMATICAL STUDY OF THE SOLAR CORONA.—The Smithsonian Institution, Washington, has published a paper by Prof. Frank H. Bigelow in which the solar corona is discussed by spherical harmonics. The subject is treated by this theory on the supposition that the phenomenon seen is similar to that of free electricity, the rays being lines of force and the coronal matter being discharged from the body of the sun, or arranged and controlled by these forces. In order to give the solution a general foundation the important parts of the theory of harmonics specially relating to the case are recapitulated, and the corresponding geometrical solution given in a notation adapted to the sun. An analysis of the lines of force demonstrates the applicability of the formulæ of statical electricity to the coronal structure, hence some repulsive force must exist on the surface of the sun which acts upon the corona according to the laws of electric potential. It is shown how the concentration of potential at each pole throws vertical lines of force at the polar region, which gradually bend each side, and finally close on the equator at a certain distance from the centre. Similarly other lines are traced which leave the sphere at various angles to the vertical axis and have diminished potentials; these therefore close on the equator at a less distance from the centre than the high potential vertical lines thrown out at the polar region.

Applying these electrical principles to the solar corona, the author thinks that the straight polar rays of high tension carry the lightest substances, such as hydrogen, meteoritic matter, debris of comets and other coronal material away from the sun, and they soon become invisible by dispersion. The strong quadrilateral rays which form the appendages conspicuously seen at periods of great solar activity are produced by four lines of force having potential 0.9, 0.8, 0.7, and 0.6, of the potential at each pole, and the explanation of the long equatorial wings, with absence of well-marked quadrilaterals, seen at periods of minimum, is that they are due to the closing of the lines of force about the equator. The theory is tested by applying it to two photographs taken by Messrs. Barnard and Pickering on January 1, 1889, and Prof. Langley submits it to astronomers and physicists as a possible clue to the explanation of the corona and as suggesting the direction to be taken in future observations and investigations.

SOLAR OBSERVATIONS.—The following is the résumé of solar observations made at Rome, by Prof. Tacchini, during the first three months of this year:—

Spots and Faculae.

1890.	No. of days of observation.	Relative frequency		Relative magnitude		Number of spot-groups per day.
		of spots.	of days without spots.	of spots.	of faculae.	
Jan. ...	20	1.40	0.55	2.35	33.50	0.60
Feb. ...	23	0.13	0.95	0.09	13.26	0.04
Mar. ...	20	1.00	0.70	2.75	25.75	0.30

Prominences.

1890.	No. of days of observation.	Mean number.	Mean height.	Mean extension.
Jan. ...	12	1.92	33.6	1.7
Feb. ...	16	1.69	37.8	0.9
Mar. ...	14	2.21	35.5	1.1